

AC SERVO DRIVE DSD SERIES

USER' S MANUAL



VITAL SYSTEMS INC
<http://www.vsys.co>

Precautions and Explanations

■Transport and storage

- Do not stack product package more than six layers;
- Do not climb, stand on or place heavy stuff on the product package;
- Do not pull the cable still connecting with machine to move product.
- Forbid impact and scratch on the panel and display;
- Prevent the product package from humidity, sun exposure, and rain.

■Wiring

- Ensure the persons involved into wiring and inspecting are specialized staff;
- Guarantee the product is grounded with less than 4Ω grounding resistance. Do not use neutral line (N) to substitute earth wire.
- Ensure grounding to be correct and solid, in order to avoid product failures or unexpected consequences;
- Connect the surge absorption diodes to the product in the required direction, otherwise, the product will be damaged;
- Ensure the power switch is OFF before inserting or removing plug, or disassembling chassis.

■Overhauling

- Ensure the power is OFF before overhauling or components replacement;
- Make sure to check failures after short circuit or overloading, and then restart the machine after troubleshooting.
- Do not allow to frequently connect and disconnect the power, and at least one minute interval between power-on and power-off.

■Maintenance

Please implement routine inspection and regular check upon the following items, under the general usage conditions (i.e. environmental condition: daily average 30℃, load rate: 80%, and operating rate: 12 hours/ day)

Routine Inspection (Regular Check):

Confirm environmental temperature, humidity, dust, or foreign objects.

Confirm abnormal vibration and noise;

Check whether vents are blocked by yarn etc..

Routine(One year):

Check whether solid components are loose .

Confirm whether terminal block is damaged.

■ Guarantee period

- the guarantee period is 12 months (from the date of shipment). if it is broken under correct operation in guarantee period. we can promise give our customer repair for free.

● broken by the reason as below, customer need pay for the maintainance:

1.wrong operation and repair by customer themselves,retrofit induce driver broken.

2.broken by fire,water,abnormal voltage,other accident or twice accident induced device broken.

3.broken by human accident.

4.doesn't operate base on our use mamual book.

Anyother reasons,please contact us.

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CHAPTER 1 PRODUCT'S INSPECTION AND INFORMATION

1.1 Product's inspection

The product's function and stability has been tested before shipment, for avoid some abnormal oversight accident induce the problem happen in transportation, pls check the items as below:

Pls confirm if the product's model number and make sure it is the model you want. Compare the product list and see if accessories integrity and not been broken. Check the appearance of motor and driver, if it is damage by the transportation, do not electrify.

Inspection if any parts fall off.

Inspect the axis of the motor can rolling by hand smoothly. Note motor with break can't be roll without external breaking power .

If any abnormal happen as describe above, pls contact us as soon as possible.

1.2 Product,s nameplate

DSD20 : DS—denver servo , D—driver, 20—20A

1.3 Technical specifications of servo driver

Base specific ation	control technique			Three phase full-wave rectification SVPWM Space Vector cotrol
	Powe input			AC220V -15%~10%
	reaction			2500-line incremental photoelectric encoder
	Use condition	use/Storage temperature		45℃/-40℃~55℃
		use/Storage humidity degrees		40%~80%/90%(non condensing)
		Protection level		IP10
		Vibration resistance/ in pact resistance		4.9m/s2/19.6 m/s2
		sea level elevation		<1000m,1000m reduce rate voltage
Atm press		86~106kpa		
Position mode	Input signal	Comm and inpulse	Impulse various	1. inpulse+direction 2. inpulse+inpulse 3. A+B 90° Orthogonal pulse
			Pulse form	1. Differential drive 2. collector open circuit
			Impulse frequency	1. Differential drive: 500K 2. collector open circuit: 200K
Speed mode	Simulation command input			-10V~10V input impedanc 10kΩ
	Command +/-speed			Parameter setting
	Instructions percentage			Parameter setting
	Instructions source Simulation			External analogue Internal speed instructions

Torque mode	Simulation command input	-10V~10V input impedanc 10kΩ
	Command +/-speed	Parameter setting
	Instructions percentage	Parameter setting
	Instructions source Simulation	External analogue Internal speed instructions
I/O signal	Pulse output signal	Encoder A,B,Z differ act output Zsignal corrector output
	Input signal	Servo EN, ACLR, Position banned, Are turning the limit, Reversal limit, conrol mode.
	Output signal	Positioning complete, Servo alarm, servo ready, break output, zero point output.
Built in Functions	Defencive function	Overcurrent, overvoltage, low voltage, overload, over heat, lack phase, over speed, encoder abnormal, outoftolerance, mode abnormal alarm etc.
	Surveillance Function	Rotate speed, current location, current pulse, frequency, positional deviation, Motor torque, Motor curren, Analog input values, etc.
	Communication function	6 point LED display
Other characteristics	Speed regulation ratio	1: 5000
	Speed fluctuation rate	< ± 0. 03% (Rated load in)

CHAPTER II INSTALLMENT

2.1 SERVO DRIVER'S INSTALLMENT

2.1.1 Installing environmental conditions

The install environment has directly effect of driver's function and service life; so it must be installed under condition as below:

1. Working temperature: 0~45℃; Work environment humidity; lower than 40%~80% (non condensing).

2. Storage environment temperature: 40~55 ℃ ; Storage environment humidity: lower than 90% (non condensing).

3. vibrate: lower than 0.5G.

4. To prevent the rain drops of rain or moist environment.

5. Avoid direct sunlight.

6. Prevent oil mist, erosion of salt.

7. Prevent corrosive liquid, gas.

8. Prevent dust, cotton fibre And metal scraps into thin.

9. Far from radioactive substances and flammable objects.

10. Many driver install in one box. pls remain enough space between each driver. it is better for flow of air to help heat dissipation. Please plus the configuration of the fan. make sure the temperature not too high. The safe temperature is 45℃.

11. Near a vibration sources, pls add a vibration absorber or vibration rubber gaskets if can not avoid the vibration.

12. Jamming equipment around the servo drive will produce interference, resulted in false operation. Noise filter and other anti-jamming measures can be used to guarantee drive to operate normally. Please note that leakage current will increase after noise filter added. To avoid the above situation, isolation transformer can be adopted. Please pay special attention that reasonable wring and shielding measures can prevent drive control signal from interference.

2.1.2 Use under harsh environments

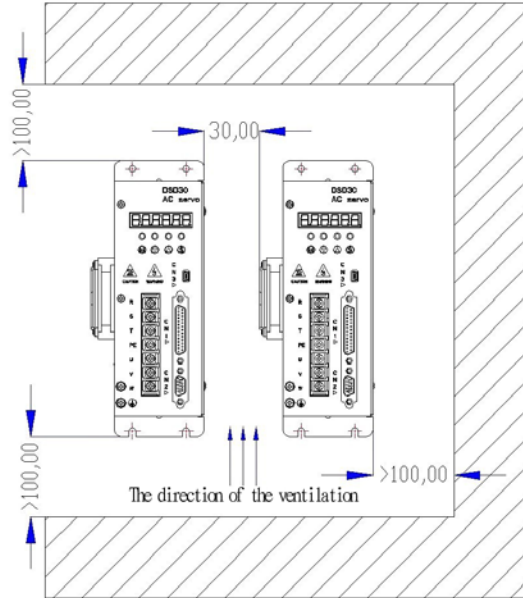
When used in harsh environments, servo drive will contact with corrosive gases, moisture, metal dust, water and processing liquids, which shall bring the malfunctions. Therefore, noise filter and other anti-interference measures should be taken to ensure the drive to work normally. Please note that leakage current will be increased after installed noise filter. In order to avoid the above situation, you can select isolation transformer, in particular, control signal lines of drive are easy to be interfered and reasonable wiring and shielding measures should be considered.

2.1.3 Installation method

- Installation direction: the direction of the normal installation is vertical upright orientation.

- Fixing: 4 pieces M5 screw on servo drive should be fixed.
- Ventilation and cooling: natural cooling mode is adopted. Cooling fan should be installed in the electric control cabinet.

2.1.4 Multi- drivers install



2.2 Servo motor's install

- Working environment temperature: 0°C ~ 45°C . Work environment humidity, lower than 40%~80% (non condensing).
- Storage environment temperature: 40°C ~ 55°C & ?Storage environment humidity, lower than 80% (non condensing).
- vibrate: lower than 0.5G.
- Avoid direct sunlight.
- Prevent oil mist, erosion of salt.
- Prevent corrosive liquid, gas.

2.3 Notice of installment

Do not hit motor or motor shaft while disassembling pulley, in order to prevent encoder from damage; use spiral drawing tools for disassembly; Prohibit large axial and radial load on motor; suggest to select flexible coupling to connect the load; Fix motor with washer fastening to prevent the motor from losing.

2.4 Motor rotation direction definition

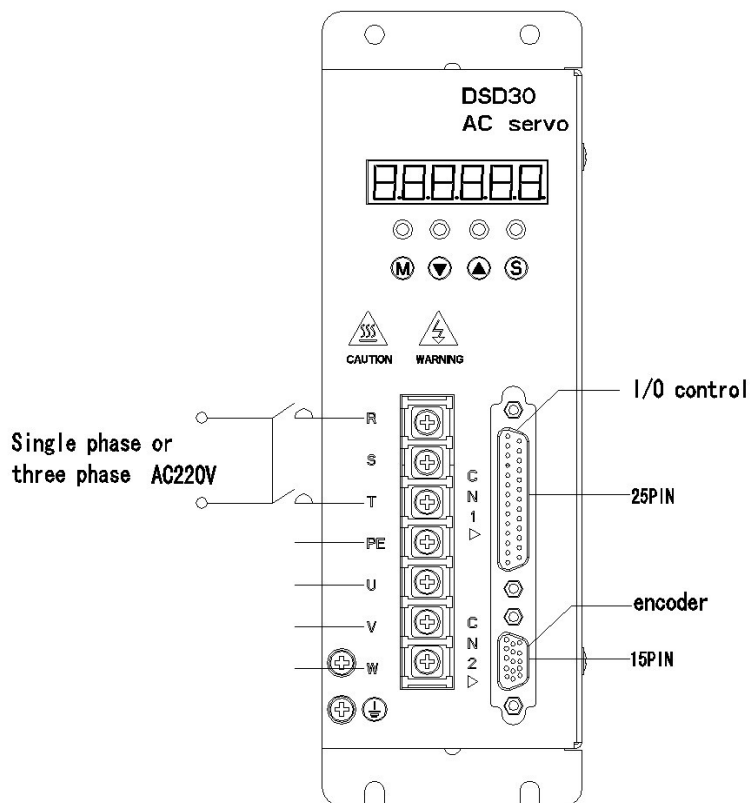
Face motor's shaft extension, counterclockwise rotation direction is forward, clockwise rotation direction is inversion. The driver's num 39 parameter can change the motor's rotate direction, According to the situation to change the direction.

Chapter III Wiring

3.1 Wiring requirement

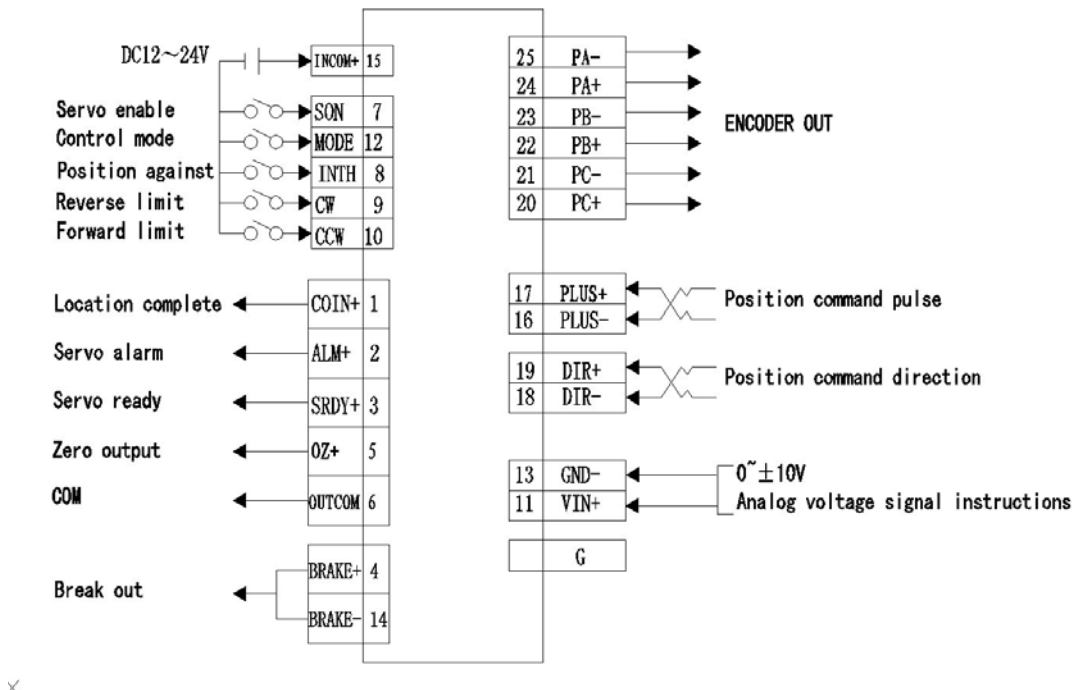
- Use correct wire material according to the wire use specification,
- Cable Length .Instructions cable , less than 3m,encoder wire must less than10m.
- Check R,S,T power box wire connecting correct or not,do not connect with 380V power source;
- Motor U,V,W connector,much match motor's relevant connector, wrong connect will induce motor stop or damage;
- Must be reliable grounding.And the single point grounding.
- Avoid wrong motion by noise,pls add insulating transformer in the power source and noise prevent device.
- Signal wire keep distance more than 30cm to match power wire(power line/motor line), do no put them in same wiring tube.
- Pls install using type circuit breaker make sure driver can cutting down power in emergency situation.
- Pls install Surge absorption components to match circuit's Perceptual component, DC coil reverse in parallel fly-wheel diode, AC coil in parallel with Resistance and capacitance absorption loop.

3.2 Motor and power's wiring diagram



Mark	Signal Name	Signal function
R	Three-phase or single-phase main power	AC220V 50HZ , Can not be connected with the motor UVW.
S		
T		
U	Servo Motor	UVW—one correspondence with the motor must be connected to
V		
W		
PE	Grouding	Then motor shell

3.3 Signal controller terminals



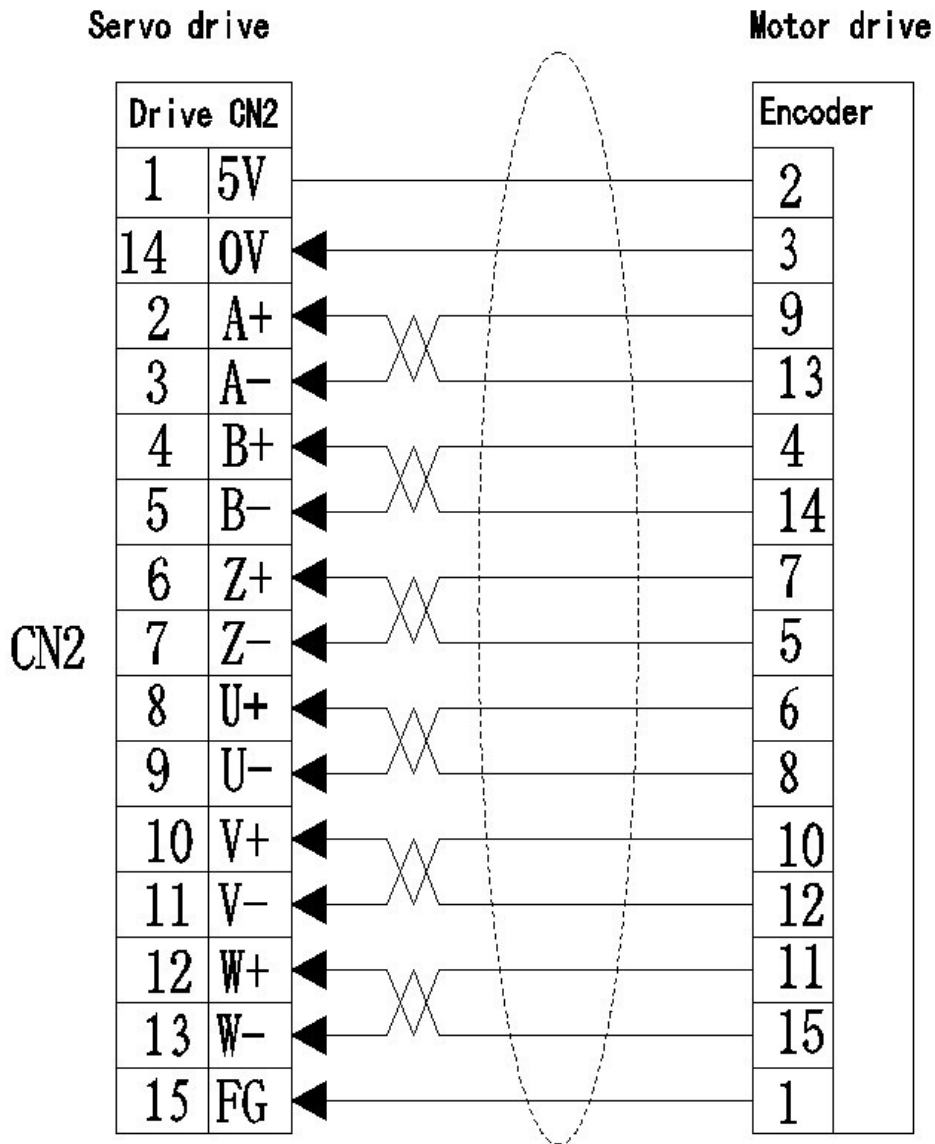
PIN	Signal Name	Mark	I/O	Signal function
1	Position completed	COIN+	output	① Positioning complete output, when the position deviation is less than the range set out in force ② End of output within the pulse is running efficiently. ③ The percentage of the output torque to reach P46 ● Parameter P2 set up this feature
2	Servo alarm	ALM+	output	Servo alarm output valid
3	Ready output	SRDY+	output	Servo ready for trouble-free alarm output valid

4	Brake signal+	BRAKE+	output	After Servo is enable ,brake signal is effective.
14	Brake signal-	BRAKE-	output	
15	Positive input signal power	INCOM+	input	Input terminals of the power used to drive the positive input terminals of the optocoupler DC12~24V, current>=100mA
7	Servo Enable	SON	input	Servo enable input terminals SON On: Allowing the drive to work SON Off : Drive off, stop working .Motor in a free state. Could be located P6=1 mask this feature.
8	Command pulse and alarm clear signal to prohibit	INTH	input	Position command pulse input terminals to prohibit, the parameter P49=0、1、2 to set this feature. 0: Invalid, does not detect the signal INTH. 1: Detection INTH signal effective 2: Test INTH effective and to remove the remaining.
9	Forward limit	CWL	input	Motor Forward limit input signal, the parameter P48=1 configure this feature, P48=2 is not warning.
10	Reverse limit	CCWL	input	Motor Reverse limit input signal, the parameter P48=1 configure this feature, P48=2 is not warning.
12	Control method or function selection	MODE	input	① 位置和速度功能选择,有效时选择速度控制 ② 内部速度选择,有效时选择内部速度 ③ 内部脉冲方式启动信号
13	Analog GND	Vgnd	input	External speed or torque command: 0~±10V
11	Analog input	Vin	input	
16	Pulse signal-	PULSE-	input	External position control command, parameter setting mode P34. 0: Pulse+Sign pulse plus direction 1: CW+CCW positive, inversion of control 2: A+B 90° quadrature pulse
17	Pulse signal+	PULSE+	input	
18	Direction signal-	DIR-	input	
19	Direction signal+	DIR+	input	
5	Encoder Signal Z	OZ+	output	Open-collector output ,to end the OUTCOM
20	Encoder signal Z+	PZ+	output	Z motor encoder signal output

21	Encoder signal Z-	PZ-	output	B motor encoder signal output
22	Encoder signal B+	PB+	output	
23	Encoder signal B-	PB-	output	
24	Encoder signal A+	PA+	output	A motor encoder signal output
25	Encoder signal A-	PA-	output	

3.5 CN2 encoder Terminal

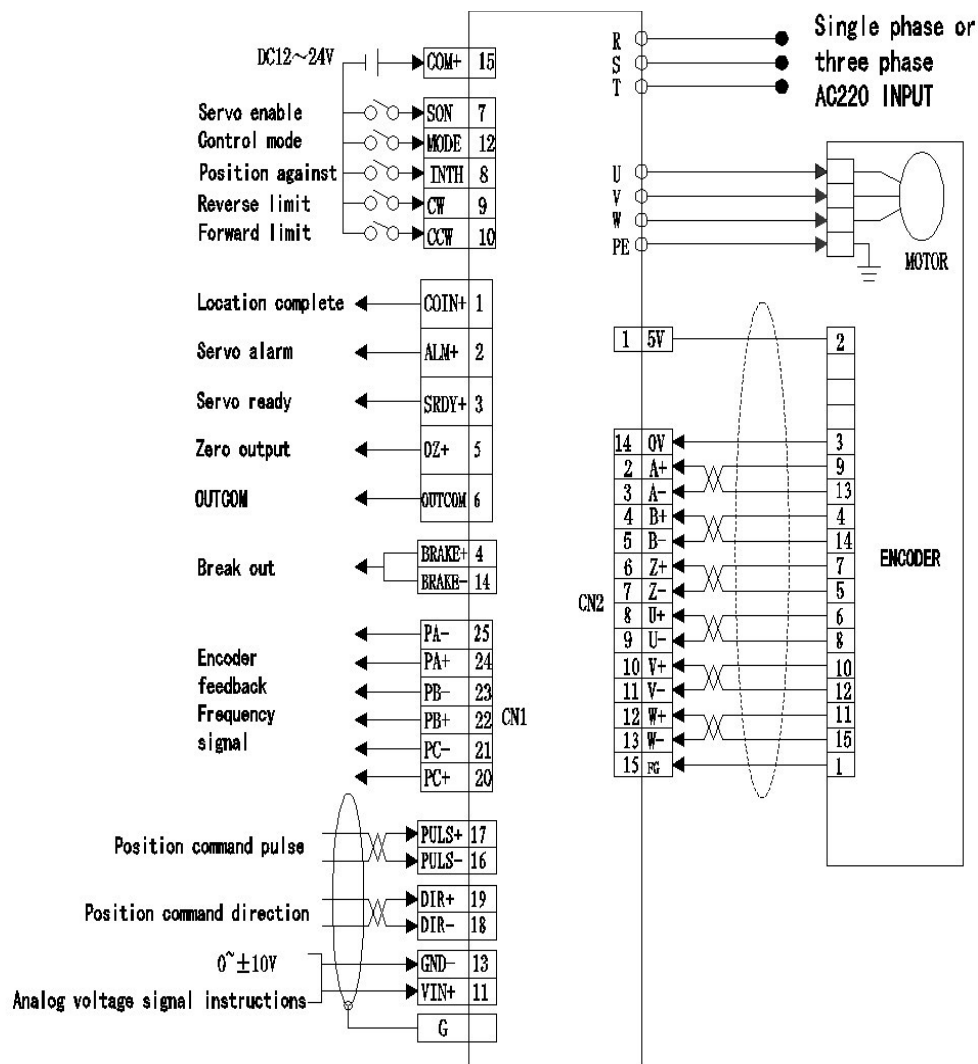
CN2 encoder Terminal



PIN	Name	Description	PIN	Name	Description
2	A+	PG input A+	8	U+	PG input U+

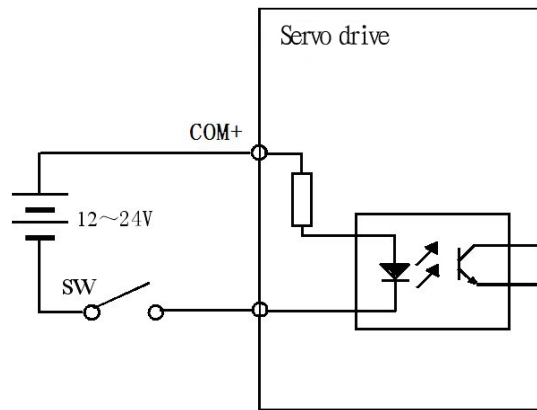
3	A-	PG input A-	9	U-	PG input U-
4	B+	PG input B+	10	V+	PG input V+
5	B-	PG input B-	11	V-	PG input V-
6	Z+	PG input Z+	12	W+	PG input W+
7	C-	PG input Z-	13	W-	PG input W-
1	5V	PG power +5V	14	0V	PG power 0V

3.7 whole wiring diagrams



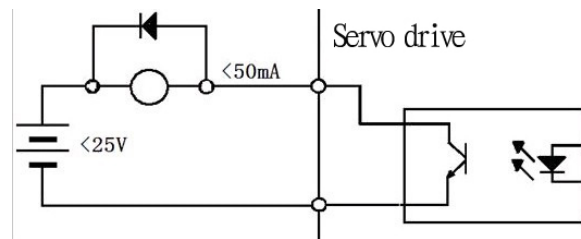
3.8 Principles of input and output interfaces

3.8.1 EN, MODE, INTH, CW, and CCW Switch Input Interface



1. by the user to provide power , DC 12V-24V, current $\geq 100\text{mA}$.
2. Please note the reversed current polarity will cause servo drive to fail to work properly.

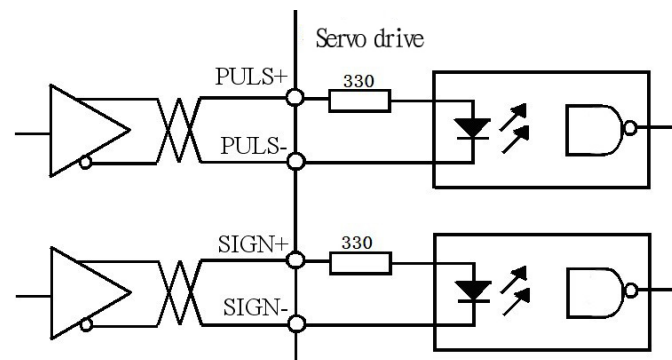
3.8.2 SRDY, ALM, BRAKE, COIN, and OZ Switch Output Interface



1. OZ, SRDY, COIN, and ALM signal maximum current is 20mA; BRAKE signal maximum current is 50mA;
2. Output is open collector form.
3. please note the reversed current polarity will lead servo drive to be damaged.

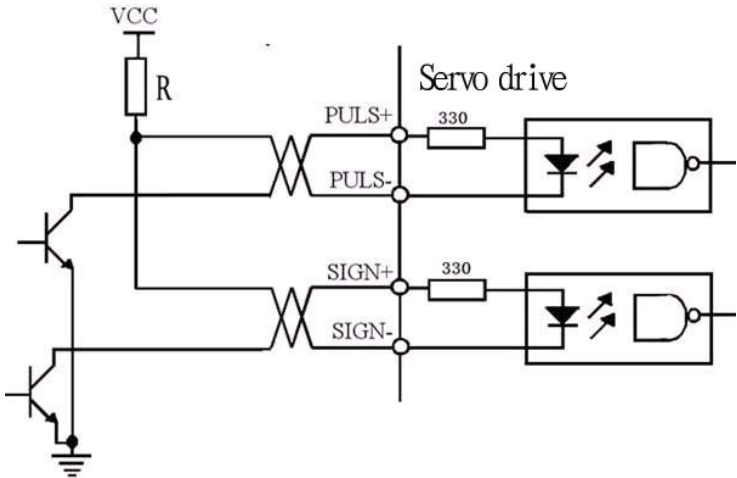
3.8.3 Pulse Signal Input Interface:

Pulse signal input interface of the differential drive mode:



1. required pulse frequency $\leq 500\text{ kHz}$. Duty cycle is 1:1, and actual demand is to be required to pass $0.4\mu\text{s}$.
2. adopting differential drive mode .

3. AM26LS31, MC3487 or similar RS422 line drivers should be used.
Pulse signal input interface of the differential drive mode:



- Pulse signal single-ended input (Applicated to PLC upper monitor and so on.)
- usually used as PLC pulse control voltage Resistance value R (reference value):
24V: 2KΩ 12V: 1KΩ 5V: 100Ω
 - driver current 10~15mA.
 - noted do not connect in reverse for polar of power
 - pulse frequency ≤ 200KHz.
 - the connection is used as Mitsubishi PLC .

Pulse signal single-ended input mode

Pulse Input Modes

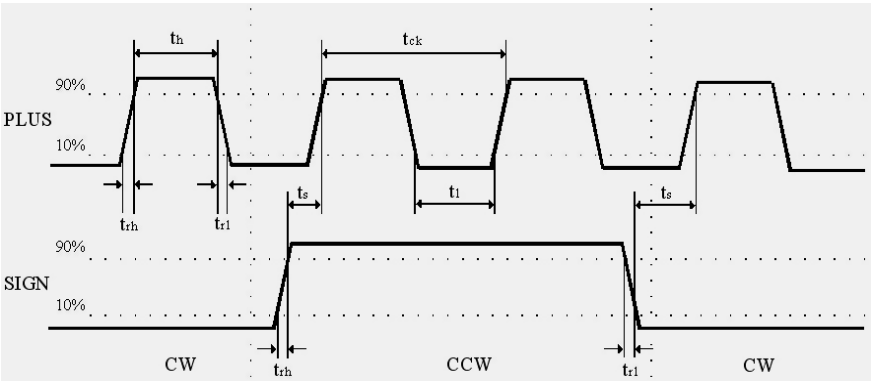
Pulse command		P34 settings
Pulse + sign	PULS	0
CCW Pulse CW Pulse	PULS	1
A + B Puls	PULS	2

Pulse Input Timing Parameters

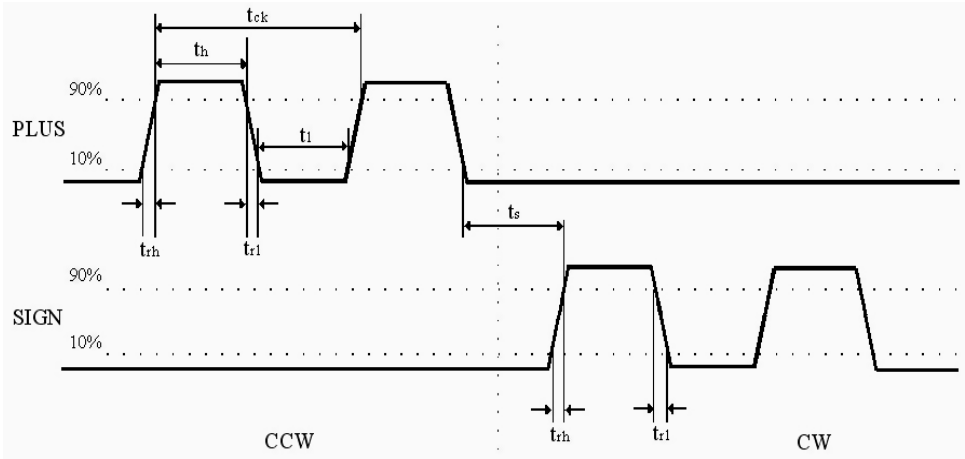
Parameter	Differential Driver Input	Single-ended driven input
-----------	---------------------------	---------------------------

tck	>2uS	>5uS
th	>1uS	>2.5uS
tl	>1uS	>2.5uS
trh	<0.2uS	<0.3uS
trl	<0.2uS	<0.3uS
ts	>1uS	>2.5uS
tqck	>8uS	>10uS
tqh	>4uS	>5uS
tql	>4uS	>5uS
tqrh	<0.2uS	<0.3uS
tqrl	<0.2uS	<0.3uS
tqs	>1uS	>2.5uS

Pulse + Sign Input Interface Timing Diagram (Pulse Frequency $\leq 500\text{kHz}$)



CW + CCW Pulse Input Interface Timing Diagram (Pulse Frequency $\leq 500\text{kHz}$)



4.1 Servo System panel

Servo System panel comprises 6 LED digital tube displays and 4 keys. Digital tube is used to show the various states and parameters of servo drive; key is used to set and access system parameters.

4.2 Keyboard Operation

Drive panel comprises 6 LED digital tube displays and four keys “DEC” , INC” , “M” , “S” to display various states of the system and set parameters. Key features are as follows:

“DEC” : parameter number, value increase, or motor running forward under the JOG mode;

“INC” : parameter number, value reduction, or motor running reversely under the JOG mode;

“M” : function options, or the current digital cursor moving left.

“S” : function key for confirmation, or data entry confirmation.

Under normal circumstances, press "M" to entry ① "parameters" setting, ② "parameter written", ③ “Display state” , all of which can be cycle selected.

① "Parameter": P1--P68

② "Parameter writing": It is valid when entering right password;

③ "Display state": Same as indicated content of P3 parameter

The servo system is normally displayed with the following 11 methods:

1. display motor rotation speed : parameter P3=0, unit r/min
2. display motor current : parameter P3=1, unit A.
3. display motor torque percent: parameter P3=2, unit Nm
4. display position : parameter P3=3, unit pulse
5. display position deviate : parameter P3=4, unit pulse
6. display frequency of the input pulse: parameter P3=4, unit KHz
7. input pulse 4-bit lower: parameter P3=6, unit pulse
8. input pulse 4-bit higher: parameter P3=7, unit x10000pulse
9. Indicating motor operation position 4-bit lower: parameter P3=8, unit pulse
10. Indicating motor operation position 4-bit higher: parameter P3=9, unit pulse
11. display speed of motor: parameter P3=9, unit mm/min

When password of input system fails to be found, you can access P3 "parameters" view, and enter password to modify P3 parameter; however, other parameters cannot be changed.

4.3 Parameter Settings

● Parameter P1 is input to display “0” ; at this situation, “Enter” key can be pressed directly to indicate that system password has been input.

4.3.1 Password input and changes

1. Password must be entered into the system for system parameter setting of each boot. P1 parameter input is system password input. When the input password is correct, it can set other parameters; otherwise other parameters cannot be set.

2. Password is '1'.

4.3.2 Parameter settings

1 Under normal circumstances, press "M" to entry ① "Parameters".

2. Press " INC " or " DEC " keys to select the parameters number which you want to modify, and then press "S".

3) Press " INC " to auto-add one value, press " DEC " key to auto reduce one value, and press "M" key to shift current the current number(decimal point position) to the left, and press "S" key for data confirmation.

4.3.3 Parameter writing:

1. In the display status, press "M" and select to enter "parameter writing" parameter writable state, When changed parameters by user need to save for long term, parameter writing operation should be implemented.

2. Press "S" key for three seconds, and the parameters will be written in the internal EEPROM.

3. then press "S" key to return, after writing completion and showing.

Chapter V Parameters

Personnel involved into parameter adjustment must understand the meaning of parameters, for the wrong settings may cause equipment damage and personnel injury; It is suggested that all the parameters adjustment should be under the situation of the servo motor stationary.

Parameter List:

No.	Parameter Name	Fuction Description	Parameter range	Factory Default
P1	Parameter password	Guard against mistaken or ill-purposed change of parameter. The password is 1.		1
P2	Motor model	1: Motor model is 60-01330 400W 2: Motor model is 80-02430 750W 3: Motor model is 80-04025 1KW 4: Motor model is 110-04030 1.2KW 5: Motor model is 110-05030 1.5KW 6: Motor model is 110-06030 1.8KW 7: Motor model is 130-04025 1KW 8: Motor model is 130-05025 1.3KW 9: Motor model is 130-06025 1.5KW 10: Motor model is 130-07725 2KW 11: Motor model is 130-10025 2.6KW 12: Motor model is 130-15015 2.3KW	1~12	1
P3	First display status	0 : display motor rotation speed (r/min) 1: display motor current (A) 2: display motor torque percent (NM) 3: display position (pulse) 4: display position deviate (pulse) 5:display frequency of the input pulse (kHz) 6: input pulse 4-bit lower (pulse) 7: input pulse 4-bit higher (pulse) 8: Indicating motor operation position 4-bit lower (pulse) 9: Indicating motor operation position 4-bit high(pulse) 10: display speed of motor (mm/min)	0~10	0
P4	Display alarm number	1 : Display alarm number and put "UP" to display ather alarm number. 2:clear alarm number. 3: Search moto origin.	0~3	0
P5		1: resume system default parameter, and save to the EEPROM. After saved, display the End.	0~3	0

		2: Auto revise the current of V and W, and autosave to P17 and P18 parameter. 3: Auto revise the voltage of V and W, and autosave to P19 parameter.		
P6	Set SRV-ON disable	0: Enable 1 : Disable , won' t examine SRV-ON input signal.	0~1	1
P7	Select control mode	0: Position control mode 1: Speed mode: external analog voltage input 2: Torque mode: external analog voltage input 3: JOG mode: key control 4 : Torque and speed mode: MODE control. 5: 4 sections speed control. 6: 16 sections speed control. 7: inner pulse control inner startup.	0~7	0
P8	Current loop proportion gain	①As this is bigger, response is more rapid, and easy to produce vibration . ②Commonly set to be zero except very high response frequency is needed.	0~30000	420
P9	Current loop integral gain	①The value is bigger, response is more rapid, and easy to produce vibration. ② the load is bigger, and the value is smaller.	0~30000	0
P10	Current loop output max	To restrict current loop output max value.	0~100	80
P11	Speed loop proportion gain	Set proportional gain of speed loop regulator; Bigger in its set value, bigger in gain and rigidity; the parameter value can be determined upon the specific servo drive model and loading situation. Generally, bigger in load inertia, bigger in its set value; It can be possibly set to be bigger under the situation of system without vibration.	0~30000	1600

P12	Speed loop integral gain	Set integral time constant for speed loop regulator; Bigger in its set value, faster in integral speed, and stronger in system deviation resistance, i.e. bigger in rigidity; However, too big value will produce overshooting.It can be possibly set to be smaller under the situation of system without vibration.	0~30000	100
P13	Analog voltage input zero-bias	1:0.1V voltage.Used for speed control or torque control of the 0V voltage regulator.	0~100	5
P14	Position loop proportion gain	Set the proportional gain for position loop regulator;Bigger in set value, higher in gain and rigidity. Under the condition of identical frequency command pulse,position lag will be smaller; however, too big value will lead vibration and over-regulation of system; The principle of debugging is to possibly adjust this parameter to be bigger, under the situation of guaranteeing the system to operate without vibration nand jetter.	0~30000	740
P15	Position loop feed- forward	The value is bigger,the position Deviation is smaller.Commonly, the value is zero.	0~30000	0
P16	Speed loop feedback filter time		0-256	8
P17	The value of Iv zero-bias	Save The value of Iv zero-bias.		
P18	The value of Iw zero-bias	Save The value of Iw zero-bias.		
P19	The value of external analog voltage zero-bias	Save the value of external analog voltage zero-bias. P5=3,and auto get the value.		
P20	Current loop feedback filter time			8
P21	JOG, speed, and torque control acceleration and reduce time	As this is bigger , speed response is more rapid and reduce is bigger.	0~30000	200

P22	Fix position control acceleration and reduce time	As this is bigger , speed response is more rapid and reduce is bigger.	0~30000	10
P23	Position order pulse numerator 1	① Motor' s pulse number per rotate =10000x numerator / denominator ② Electronic gear G= numerator / denominator 1/30000<G<30000	1~30000	1
P24	Position order pulse denominator		1~30000	1
P25	preparation			
P26	Power vantage alarm	0: alarm is effective. 1: alarm is invalid.	0~1	0
P27	Moto rated current	For overcurrent protect. 1=0.1A	0~300	40
P28	Moto rated speed	Restrict position loop max output, and overspeed alarm	0~6000 r/min	3000
P29	Speed loop output max torque	Restrict speed loop output and overloading protect	0~130	60
P30	Encode number			2500
P31	Servo motor' s pole number	Please look the motor manual book		4
P32	Motor encode mode	0: U、V、W signal 1: No U、V、W signal	0~1	0
P33	Check overspeed alarm	0: alarm is effective, over rated speed 10% 1: alarm is invalid.	0~1	0
P34	Pulse mode	0: Pulse+Sign 1: CW+CCW 2: A+B 90°	0~2	0
P35	JOG speed value	JOG speed	-3000~3000	100
P36	Search moto origin.	P36=1 the same to P4=3.	0~1	0
P37	Moto encoder origin	Storage moto encoder origin		
P38	Check encode signal alarm	0: Enable 1: Disable , don' t check encode signal input	0~1	0

P39	Reverse speed order direction	0: No change ,in position and speed control 1: Reverse ,in position and speed control 2: Speed and torque control direction by CW/CCW	0~2	0
P40	Drive overload alarm percentage	Moto rated torque load exceeds the percentage of P27 ,alarm ER0-12.	1~300%	200
P41	Orientation finish range	As difference count isn' t larger than this value , orientation will be complete.	0~30000	3
P42	Position control of the ultra-poor alarm	0: alarm is effective. 1: alarm is invalid.	0~1	0
P43	Location-tolerance detection range of	As difference count is larger than this value ,alarm of positioning will produce	0~30000	3000
P44	preparation			
P45	preparation			
P46	preparation			
P47	Encoder lines sub-frequency	Encoder output A,B sub-frequency signal must be an even number.	0~127	0
P48	Settint limit CW、CCW	0: Invalid,does not detect CW,CCW signals 1: Detection CW,CCW signals,CW and effective when the motor is transferred limit,CCW valid motor reversal limit ,and alarm. 2: Detection CW,CCW is not valid alarm ,but motor stops running.	0~2	0
P49	Set the servo input signal is valid INTH	0: Enable 1:Disable , won' t check INTH signal input 2: Enable and Clear remain pulse Notice : clear alarm.	0~2	0
P50	preparation			
P51	Preparation			
P52	Internal value 1			

P53	Internal value 2			
P54	Internal value 3			
P55	Internal value 4			
P56	Internal value 5			
P57	Internal value 6			
P58	Internal value 7			
P59	Internal value 8			
P60	Internal value 9			
P61	Internal value 10			
P62	Internal value 11			
P63	Internal value 12			
P64	Internal value 13			
P65	Internal value 14			
P66	Internal value 15			
P67	Internal value 16			
P68	IPM model current	DSD20set to 18, DSD30 set to 28		20

Chapter VI Operation

After completion of the installation and connection, please check the following items before power-on: Whether the power terminal wiring is correct and reliable? Whether the input voltage is correct. Whether power lines and motor wires get short circuit or grounding. Whether the control signal terminal is connected correctly? Whether power supply polarity and size are correct. Whether drive and the motor are fixed firmly.

Whether motor shaft is not connected to the load.

Whether specification of motor and driver are matching.

6.1 JOG Control of Servo System

When the system parameter is set to be P7= 3 and inner enable (P6=1), the servo system is under the mode of JOG control.

Press "UP", servo motor rotates forward; Key-up the motor stops. Running speed is determined by the setting values of parameters P35.

Press "DOWN" servo motor rotates reversely; Key-up the motor stops. Running speed is determined by the setting values of parameters P35.

JOG control acceleration and deceleration time constant is adjusted through parameters P21.

6.2 Position Control of Servo System

When the system parameters are set to be P7 =0, servo system in under position control mode. Running speed is determined by input pulse frequency; running direction is determined by the input direction and P39; running pulse mode is set by P34. When P49 = 1, 2, and INTH signal is valid, this function can be terminated. Electronic gear is determined by P23 and P24.

6.3 Speed Control of Servo System

When the system parameters are set to be P7 =1, servo system is in the speed control mode. The maximum operating speed is determined by the parameters P28. The maximum operating speed refers to the operating speed when input voltage is 10V.

Operating speed is determined by Vin1 voltage, and direction is determined by the symbols of Vin 1 and P39. When P39=2, direction is determined by CW and CCW, wherein, CW and CCW respectively refer to motor rotation forward and reversely.

Zero-drift of speed control is adjusted through parameter P13, and adjusting this parameter to set motor speed to be 0 when input voltage is 0V.

Speed control acceleration and deceleration time constant is adjusted through the parameter P21.

6.4 Torque Control of Servo System

When P7 = 2, Inner enable (P6=1), servo system is in torque control mode. Torque is determined by the input voltage Vin1. The direction is determined by the symbols of Vinland P39. Input voltage is maximum torque when the torque is 10V.

Zero-drift of torque control is adjusted through the parameter P13, and

adjusting this parameter to set motor speed to be 0 when input voltage is 0V.

6.5 Internal Speed Control Servo System

When the system parameter is set to be P7= 5, servo system is in the internal speed control mode.

After the input signal MODE (level signal) is input and valid, the motor starts; after the input signal INTH (NC signal) is input and effective, the motor stops. Speed is determined by the input signals CW and CCW decision. Please see the below table:

MODE signal	CCW signal	CW signal	Motor speed
			0
1	0	0	P52
1	0	1	P53
1	1	0	P54
1	1	1	P55

Chapter VII Error Alarm

Do not touch drive and motor within 5 minutes after driver and motor power-off, to prevent person from injury due to electric shock; Allow to use drive after drive alarm code troubleshooting while drive failure alarms; Show Er0-xx and blinking while error is found, wherein xx refers to alarm code; Operate drive to view and modify parameters after alarming.

Alarm List:

Alarm Code	Alarm Content	Cause of the malfunction
ER0-00	Normal	
ER0-01	Motor speed is too high	1.Encoder wiring error 2.Encoder damage 3.Running too fast
ER0-02	The main circuit supply voltage is too high	1.The supply voltage is too high(more than +20%) 2.The circuit board failure
ER0-03	Power supply voltage is too low	① Servo system doesn't connect with power ② Insurance ruins
ER0-04	Position error too big	① Machine is block ② input pulse frequency is too high ③ Encoder zero change in ④ P43 parameter setting is too small ⑤ P42 mask this feature ,will not alarm
ER0-05	Drive temperature is too high	
ER0-06	EEPROM Memory error	
ER0-07	CW motor forward limit	The CWSTP switch be bumped
ER0-08	CCW motor reverse limit	The CCWSTP switch be bumped
ER0-09	Encode UVW trouble	1.Encoder damage 2.Encoder wiring is damaged or broken 3.P38=1 mask this feature ,you will not alarm
ER0-10	overcurrent alarm	1.More than 300% rated current 2.Circuit board fault 3.overload
ER0-11	IPM module fault	1.Electrical lines U,V,W short-circuit 2.overcurrent 3.motor is damage 4.Gai parameter is set incorrectly

		5.module is damage
ER0-12	Motor overload alarm	Motor rated torque carried more than the percentage of parameter P40
ER0-13	Soft IPM module fault	
ER0-14	Encode ABZ trouble	1.Encoder damage 2.Encoder wiring is damaged or broken 3.P38=1 mask this feature ,you will not alarm

Chapter VIII Debugging

Motor and driver must connect to GND, PE must connect GND with Motor. Suggestions power drive provide by the isolated transformer for safely and anti-interference. Before power on, check all of connected wire are correctly. After driver fault alarm, confirm if fault are settled before re-start. Don' t touch motor and driver within 5 munities after power off for prevent shock.

It may high temperature after motor & driver running a long time for prevent burns.

8.1 Working sequence

8.1.2 Sequence of connected power

- When connect control power, servo driver alarms within 400ms; when main power is on, the alarm disappear, servo motor prepare signal ON within 1.5s, internal servo' s enable become effective, the motor excitation is on within 10ms.

8.1.3 Sequence of servo off

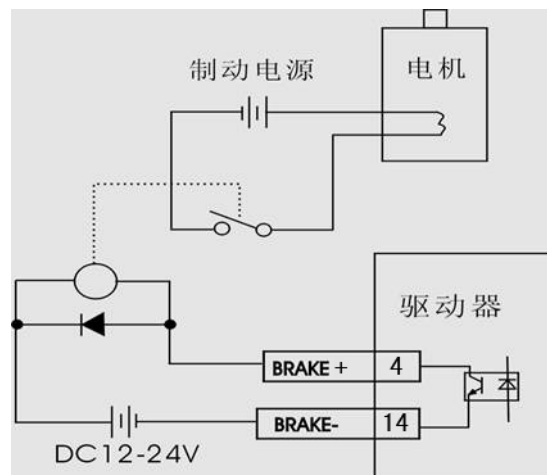
Alarm sequence during motor's running: SRDY signal and servo enable signal are ineffective at the same time, and the motor's electromagnetic brake signal is off 4ms later.

8.2 Usage of Mechanical Brake “BRAKE”

Mechanical brake is used to lock the vertical or tilt table connecting motor, to prevent motor from falling down after power-failure. The motor with brake feature should be selected to achieve this function. This brake can only be used for keep the table, not for motor's deceleration or machine' s stop. After connecting with the required voltage, the internal brake will open, and the motor bearings can rotate freely.

Using Driver BRAKE signal control intermediate relay, which is start braking power by intermediate relay (Braking power provide by user).

When install the signal, brake power must have enough capacity, then it must use free-wheeling diode as surge absorber.



8.3 Debugging

Before power on, it must check the correctness of the parameters. Incorrect parameter setting will may caused machine fault and accident. Suggestion no-load debugging firstly, then load debugging.

8.3.1 Adjustment of gain and rigidity

The servo system applies feedback system of PID adjustment, current loop, speed loop and position loop. The rule it obeys is: the inside of the ring, the need to improve its ability of response. Or it will appear over-adjust or vibration. As the current loop is enough to ensure its ability of response, usually it doesn't need to change. What should be adjusted are position loop and speed loop.

The servo adjustment of position mode as below:

- Set a relative high value of speed loop integral;
- Set a relative low value of position loop gain, then begin to add the speed if there is no vibration or abnormal noise;
- Adjust the value of speed loop integral to smaller if there is no vibration;
- Add the position loop gain until there is no vibration;
- If the electronic gear ratio is bigger, please adjust the value of P18 to make motors run at quiet;

Knowledge of mechanical system's rigidity:

- If the rigidity of the conveyors connected by belt is low, please use low rigidity parameter;
- If the rigidity of the ball screw drive by gear box is medium, please use medium rigidity parameter;
- If the rigidity of ball screw drive by servo motor is high, please use high rigidity parameter. The adjustment of servo depends on the system, which needs your careful watching, thinking, then you can find suitable parameters.